

AD-A239 089



DODPOPHM/USA/DOD/NADTR91:08

PERFORMANCE ORIENTED PACKAGING TESTING
OF
PPP-B-636 BOX
FOR
FLAMMABLE AND CORROSIVE LIQUIDS

BY:

KERRY J. LIBBERT
MECHANICAL ENGINEER

Performing Activity:
Naval Weapons Support Center Crane
Crane, Indiana 47522-5000

JUNE 1991

FINAL

DISTRIBUTION STATEMENT A

APPROVED FOR PUBLIC RELEASE:
DISTRIBUTION IS UNLIMITED.

Sponsoring Organization:
Naval Weapons Station Earle
Program Management Office - C11
Colts Neck, New Jersey 07722-5000



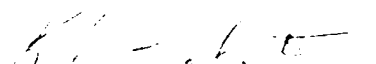
91-06652



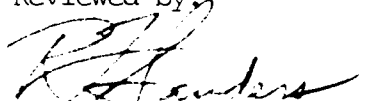
91 7 07

076

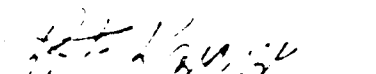
Prepared by:


K. J. Libbert

Reviewed by:


R. F. Sanders

Reviewed by:


R. F. Karcher

Approved by:


D. N. Montgomery

REPORT DOCUMENTATION PAGE

| | | | | |
|--|---|--|---|-------------|
| 1a REPORT SECURITY CLASSIFICATION Unclassified | | | 1b RESTRICTIVE MARKINGS | |
| 2a SECURITY CLASSIFICATION AUTHORITY | | | 3 DISTRIBUTION/AVAILABILITY OF REPORT | |
| 2b DECLASSIFICATION/DOWNGRADING SCHEDULE | | | Unlimited | |
| 4 PERFORMING ORGANIZATION REPORT NUMBER(S) DODPOPHM/USA/DOD/NADTR91108 | | | 5 MONITORING ORGANIZATION REPORT NUMBER(S) | |
| 6a NAME OF PERFORMING ORGANIZATION Naval Weapons Support Center | 6b OFFICE SYMBOL (If applicable) 5053 | 7a NAME OF MONITORING ORGANIZATION | | |
| 6c ADDRESS (City, State, and ZIP Code) Crane, IN 47522 | | 7b ADDRESS (City, State, and ZIP Code) | | |
| 8a NAME OF FUNDING/SPONSORING ORGANIZATION Naval Weapons Support Center | 8b OFFICE SYMBOL (If applicable) 1131 | 9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER | | |
| 8c ADDRESS (City, State, and ZIP Code) Crane, IN 47522 | | 10 SOURCE OF FUNDING NUMBERS | | |
| | | PROGRAM ELEMENT NO. | PROJECT NO. | TASK NO. |
| | | WORK UNIT ACCESSION NO. | | |
| 11 TITLE (Include Security Classification) (U) Performance Oriented Packaging Testing of PPP-B-636 Box for Flammable and Corrosive Liquids. | | | | |
| 12 PERSONAL AUTHOR(S) Kerry J. Libbert | | | | |
| 13a TYPE OF REPORT | 13b TIME COVERED FROM TO | 14 DATE OF REPORT (Year, Month, Day) 91,06,10 | 15 PAGE COUNT 7 | |
| 16 SUPPLEMENTARY NOTATION | | | | |
| 17 COSATI CODES | | | 18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number) | |
| FIELD | GROUP | SUB-GROUP | Performance Oriented Packaging, Hazardous Materials, Flammable liquids, Corrosive Liquid. | |
| | | | | |
| 19 ABSTRACT (Continue on reverse if necessary and identify by block number) | | | | |
| <p>A PPP-B-636 fiberboard box used to transport small quantities of flammable and corrosive liquids in plastic containers was tested for conformance to Performance Oriented Packaging regulations.</p> <p>The box was tested with a gross weight of 99 pounds and met the requirements and retained its contents.</p> | | | | |
| 20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS | | | 21 ABSTRACT SECURITY CLASSIFICATION Unclassified | |
| 22a NAME OF RESPONSIBLE INDIVIDUAL Kerry J. Libbert | | 22b TELEPHONE (Include Area Code) (812)854-1025 | 22c OFFICE SYMBOL 5053 | |

INTRODUCTION

A packaging configuration for flammable and corrosive liquids was tested to ascertain whether the package would meet the requirements of Performance Oriented Packaging (POP) as specified by the United Nations Recommendations on the Transport of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the rulings specified in the Federal Register/Vol. 55, No. 246/Friday, December 21, 1990/Final Rule. The objectives were to evaluate the adequacy of the container in protecting the hazardous materials.

The combination packaging consists of a plastic container, shown in Figure 1, sealed in MIL-B-131 barrier material, and packed in a PPP-B-636 fiberboard box with P-A-1056 absorbent material. The container was filled with water for the testing.

TESTS PERFORMED

1. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.3. Four outer containers were used throughout the test series instead of the required five containers. The drop height was 1.2 meters and the drop sequence was as follows:

- a. Flat on Bottom
- b. Flat on Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. One Corner

The test was performed at ambient temperature ($70^{\circ} + 20^{\circ}\text{F}$). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.6. Three different outer containers were used, each with a stack weight of 550 pounds. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

3. Base Level Vibration Test

This test was performed in accordance with Federal Register/Vol 55, No. 246/Friday, December 21, 1990/Final Rule.

BEST
AVAILABLE COPY



FIGURE 1.

one-gallon plastic container filled
with water for testing.

Three outer containers were loaded with a water-filled one-gallon bottle and closed for shipment. Each container was placed on a vibrating platform that had a vertical double-amplitude (peak-to-peak displacement) of one inch.* The packages were constrained horizontally to prevent them from falling off the platform, but were free to move vertically, bounce and rotate. The test was performed for one hour at a frequency that caused each point of the container bottom to be raised from the platform 1/16-inch. A 1/16-inch thick metal strip was passed between the bottom of the container and the platform.

TEST RESULTS

1. Drop Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Base Level Vibration Test

Satisfactory.

DISCUSSION

1. Drop Test

After each drop the container was inspected for any damage which would be cause for rejection. The corner drop damaged the box, but no contents were released. The box tested in the corner drop is shown in Figure 2 after the test.

2. Stacking Test

Three outer containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to any of the containers as a result of this test.

3. Base Level Vibration Test

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. All containers remained intact and there was no evidence of leakage of contents.



| Accession For | |
|--------------------|-------------------------------------|
| NTIS GRA&I | <input checked="" type="checkbox"/> |
| DTIC TAB | <input type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| Justification | |
| By | |
| Distribution/ | |
| Availability Codes | |
| Dist | Avail and/or Special |
| A-1 | |



FIGURE 2.

PPP-B-636 fiberboard box after corner drop.

PASS/FAIL (UN CRITERIA)

The criteria for passing the drop test is outlined in Paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Each packaging containing liquid should be leakproof when equilibrium has been reached between the internal and external pressures, except for inner packagings when it is not necessary that the pressure be equalized".

The criteria for passing the stacking test is outlined in Paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages".

PASS/FAIL (FEDERAL REGISTER CRITERIA)

The criteria for passing the Base Level Vibration Test is outlined in the Federal Register/Vol. 55, No. 246/Friday, December 21, 1990/Final Rule and states the following: "Immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. Rupture or leakage from any of the packages constitutes failure of the test".

DISCUSSION

Each substance classified as Corrosive Liquids, N.O.S. (UN1760) or Flammable Liquids, N.O.S. (UN1993) must be assigned to a Packing Group by the competent authority in accordance with ST/SG/AC.10/1, Paragraph 1.39.1. The combination packaging discussed herein was tested to Packing Group II criteria, in accordance with ST/SG/AC.10/1. Therefore, the packaging should be used only for Packing Group II materials.

REFERENCE MATERIAL

United Nation's "Recommendations on the Transport of Dangerous Goods", ST/SG/AC.10/1, Revision 6

49 CFR Part 107 et al. Performance Oriented Packaging Standards, Federal Register/Vol. 55, No. 246/Friday, December 21, 1990/Final Rule

DISTRIBUTION LIST

Commanding Officer
Naval Weapons Support Center
Code 5053 and Code 113
Crane, IN 47522-5000

Commanding Officer
Naval Weapons Station Earle
Code 403 and Code C11
Colts Neck, NJ 07722-5000

Defense Technical Information Center (2 copies)
ATTN: DTIC/FDAC (Virginia Guidi)
Bldg. 5, Cameron Station
Alexandria, VA 22304-6145

Headquarters, Military Traffic Management Command (2 copies)
ATTN: MTMC/MT-SS, James Gibson
5611 Columbia Pike
Falls Church, VA 22041-5050

DATA SHEET

CONTAINER: Fiberboard Box

Type: 4G

UN Code:

Corrosive Liquids: 3

Flammable Liquids: 8

Specification Number:
PPP-B-636

Material:
Fiberboard

Capacity:
44.95 kg
(99 pounds)

Dimensions:
.41 m (L) x .41 m (W) x .41 m (H)
(16" L x 16" W x 16" H)

Closure (Method/type):
Glass reinforced tape

Tare Weight:
1.45 kg
(3.2 pounds)

Additional Description: Liquids are packaged in collapsible container, which is sealed in MIL-B-131 barrier bag and packed in P-A-1056 absorbent material.

PRODUCTS:

Corrosive liquids
Flammable liquids

Proper Shipping Name:

Corrosive liquids, N.O.S.
Flammable liquids, N.O.S.

United Nations Number:

Corrosive liquids, N.O.S.-1760
Flammable liquids, N.O.S.-1993

United Nations Packing Group: None

Physical State: Liquid

Amount Per Container: One (1) Gallon

Net Weight: 4.37 kg (9.63 pounds)

TEST PRODUCT:

Name: Water

Physical State: Liquid

Size : .18 m L x .18 m W x .18 m H (7" L x 7" W x 7" H)

Quantity : One (1) Gallon

Dunnage: Absorbent material

Gross Weight: 44.95 kg (99 pounds)